

REMARKS

Claims 1, 4, 6-15 and 17-25 are pending in this application. Claims 10-13 have been withdrawn from consideration. Claims 5 and 16 have been canceled without prejudice or disclaimer.

Reconsideration and allowance in view of the following remarks are respectfully requested.

Applicants' representatives thank the Examiner for the courtesies extended during the personnel interview held on September 16, 2003. During the interview, Applicants' representatives explained the invention while referring to Figure 1. For example, Applicants' representatives explained that a second pump is connected to the gas introducing part to remove unwanted particulates/impurities such as water from the inside of the gas introducing part.

Applicants' representatives argued that Tomoyasu *et al.* does not disclose or suggest, *inter-alia*, "a second vacuum pump connected to said gas-introducing part so as to evacuate the reactant gas from said gas-introducing par," and explained that this reference merely discloses removing gas components via bypass 750 with the use of a clean up unit having a gas burner. Applicants' representatives also argued that there is no suggestion in Tomoyasu *et al.* to use a vacuum pump and connect the vacuum pump to bypass 750.

Applicants' representatives proposed to amend claim 1 to distinguish further over Tomoyasu *et al.* In this regard, the Examiner indicated that an amendment to claim 1 incorporating a limitation reciting the structure shown in Figure 1 may be filed.

Claim Rejections – 35 U.S.C. § 103

Claims 1, 6-7, 14, and 17-18, 21 and 24-25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tomoyasu *et al.* (US Pat. No. 5,900,103).

Claim 1 and 14 have been amended to recite, *inter-alia*, "an inlet port from which a reactant gas is introduced; an annular gas passage connected to said inlet port, said annular gas passage having a plurality of nozzles through which the reactant gas is introduced into said process chamber; a valve disposed between said inlet port and said annular gas passage..." Applicants submit that by providing an annular gas passage with a plurality of nozzles, the distribution of the reactant gas flow within the process chamber can be, for

example, made even and the distribution of the gas inside the chamber can be controlled for specific plasma processes.

Applicants submit that Tomoyasu *et al.* does not disclose, teach or suggest an annular gas passage, the annular gas passage having a plurality of nozzles through which the reactant gas is introduced into the process chamber. Indeed, Tomoyasu *et al.* merely discloses an upper electrode 730 in Figure 35 which serves as a plasma generator electrode and also as a process gas introducing passage. The electrode 730 of Tomoyasu *et al.* is a hollow aluminum-made "plate-like" electrode provided with a plurality of apertures 730a in its bottom (see col. 17, lines 1-4 in Tomoyasu *et al.*). Furthermore, referring to Figure 37, Tomoyasu *et al.* discloses "a plate-like" vaporizer 732A which is made integral to an upper electrode 730A. Its housing 742A has a plurality of apertures 772 leading to intermediate chamber 770 in the upper electrode 730A (see, col. 18, lines 10-25). Consequently, Tomoyasu *et al.* does not disclose, teach or suggest, *inter-alia*, "an annular gas passage..., said annular gas passage having a plurality of nozzles through which the reactant gas is introduced into said process chamber."

Therefore, Applicants respectfully submit that claims 1 and 14, and claims 6, 7, 17, 18, 21, 24 and 25 which are dependent from either claim 1 or claim 14 are patentable, and respectfully request that the rejection of claims 1, 6-7, 14, and 17-18, 21 and 24-25 under § 103(a) be withdrawn.

Claims 4-5, 15-16 and 22-23 are rejected under 35 U.S.C. § 103 (a) as being unpatentable over Tomoyasu *et al.* (US Pat. No. 5,900,103) in view of Li *et al.* (US Pat. No. 5,772,771).

Claims 5 and 16 have been canceled without prejudice or disclaimer. Therefore, the rejection of claims 5 and 16 under § 103 is rendered moot.

Claims 4, 15, 22 and 23 depend from either claim 1 or claim 14, therefore, for at least the reasons presented above for claims 1 and 14, Tomoyasu *et al.* does not disclose, teach or suggest the subject matter recited in claims 4, 15, 22 and 23.

With regard to Li *et al.*, the Examiner contends that Li *et al.* discloses a gas introducing part in a sidewall of the chamber having a plurality of circumferentially arranged nozzles 34, and at least one inlet port 80 from which the reactant gas is supplied, an annular gas passage 36 connected to the inlet port so that the reactant gas supplied from the inlet port is supplied to the plurality of nozzles 34 by flowing through said annular gas passage, and an

Amendment

outlet port 82 provided to said gas passage so that said-gas-evacuating arrangement is connected thereto.

Claim 1 has been amended to recite, *inter-alia*, “a process chamber in which the object to be processed is subjected to the plasma process; an inlet port from which a reactant gas is introduced; an annular gas passage connected to said inlet port, said annular gas passage having a plurality of nozzles through which the reactant gas is introduced into said process chamber; a valve disposed between said inlet port and said annular gas passage; a first vacuum pump connected to said process chamber so as to evacuate gas from said process chamber so that said process chamber is maintained at a negative pressure; an outlet port provided to said annular gas passage; and a second vacuum pump connected to said outlet port so as to evacuate the reactant gas from said annular gas passage.”

Claim 14 has been amended to recite, *inter-alia*, “a process chamber in which the object to be processed is subjected to the plasma process; an inlet port from which a reactant gas is introduced; an annular gas passage connected to said inlet port, said annular gas passage having a plurality of nozzles through which the reactant gas is introduced into said process chamber; a valve disposed between said inlet port and said annular gas passage; an outlet port provided to said annular gas passage; a first vacuum pump connected to said process chamber so as to evacuate gas from said process chamber so that said process chamber is maintained at a negative pressure; and a gas-evacuating arrangement connected to said outlet port so as to evacuate the reactant gas from said annular gas passage, wherein said gas-evacuating arrangement comprises a bypass passage which connects said gas-introducing part to said first vacuum pump by bypassing said process chamber.”

Li *et al.* merely introduces gas to manifold 36 through a common gas feed line, i.e., “inlet port” 80. However, contrary to the Examiner’s contention, the manifold 36 of Li *et al.* is not provided with a separate outlet port in which a vacuum pump is connected to evacuate the gas. The gas in manifold 36 of Li *et al.* is evacuated via the inlet port 80 which is connected to cleaning gas line 82 to vacuum pump 84. Therefore, in Li *et al.* the gas is evacuated from the manifold 36 through the same port, i.e. “inlet port” the gas is introduced into the manifold. This is performed by shutting off deposition gas valve 78, opening shutoff valve 88 (see, col. 4, lines 38-59) and drawing via vacuum pump 84. In contrast, the apparatus of claim 1 has an inlet port and an outlet port and a vacuum pump is connected to the outlet port to evacuate the reactant gas from the annular gas passage. This allows, for example, the user to clean, i.e. remove any undesired particulates including a water

Amendment

component, more efficiently from the annular gas passage. For example, the annular gas passage can be purged with an inert gas such as argon by introducing the argon through the inlet port and drawing the argon with a vacuum pump through the outlet port. Consequently, neither Tomoyasu *et al.* nor Li *et al.* disclose teach or suggest, alone or in combination, the subject matter recited in claims 1 and 14.

Consequently, Applicants respectfully submit that claims 4, 15, 22 and 23, which are dependent from either claim 1 or claim 14, are patentable and respectfully request that the rejection of claims 4-5, 15-16, 22 and 23 under § 103(a) be withdrawn.

Claims 1, 6-9, 14, 17-21 and 24-25 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Tei *et al.* (2002/0011215 A1) in view of Tomoyasu *et al.* (US Pat. No. 5,900,103).

As admitted in the Office Action, Tei *et al.* fails to teach a gas-evacuating arrangement comprising a second vacuum pump connected to said gas-introducing part or a bypass passage which connects the gas-introducing part to the first vacuum pump by bypassing the process chamber. Moreover, Tei *et al.* also fails to disclose, teach or suggest an annular gas passage having a plurality of nozzles through which the reactant gas is introduced into the process chamber as recited in claims 1 and 14.

Furthermore, as stated above, Tomoyasu *et al.* does not disclose teach or suggest an annular gas passage having a plurality of nozzles through which the reactant gas is introduced into the process chamber.

Therefore, neither Tei *et al.* nor Tomoyasu *et al.* disclose, teach or suggest, alone or in combination, *inter-alia*, "an annular gas passage connected to said inlet port, said annular gas passage having a plurality of nozzles through which the reactant gas is introduced into said process chamber" as recited in claim 1 or claim 14.

Therefore, Applicants respectfully submit that claims 1 and 14, and claims 6-9, 17-21 and 24-25 which are directly or indirectly dependent from either claim 1 or claim 14, are patentable and respectfully request that the rejection of claims 1, 6-9, 14, 17-21 and 24-25 under § 103(a) be withdrawn.

Claims 4-5, 15-16 and 22-23 are rejected under 35 U.S.C. § 103 (a) as being unpatentable over Tei *et al.* (2002/0011215 A1) in view of Tomoyasu *et al.* (US Pat. No. 5,900,103) in view of Li *et al.* (US Patent No. 5,772,771).

Claims 5 and 16 have been canceled without prejudice or disclaimer. Therefore the rejection of claims 5 and 16 under § 103 (a) is rendered moot.

Claims 4, 15 and 22-23 are dependent from either claim 1 or claim 14. Therefore, for at least the reasons provided above in claims 1 and 14, Applicants submit that claims 4, 15 and 22-23 are patentable. Thus, it is respectfully requested that the rejection of claims 4-5, 15-16 and 22-23 under § 103(a) be withdrawn.

CONCLUSION

In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

Pillsbury Winthrop LLP

By: 

Dale S. Lazar

Reg. No.: 28,872

Tel. No.: (703) 905-2126

Fax No.: (703) 905-2500

DSL/KG
1600 Tysons Boulevard
McLean, VA 22102
(703) 905-2000